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Lancaster et al.

(54) SYSTEM AND METHOD FOR CONTROLLING AND CONFIGURING A ROUTER

(75) Inventors: **Arthur Lancaster**, Austin, TX (US); **Melissa Simpler**, Austin, TX (US); **Todd Greer**, Austin, TX (US)

Correspondence Address:
TOLER LAW GROUP
8500 BLUFFSTONE COVE, SUITE A201
AUSTIN, TX 78759 (US)

(73) Assignee: **Affinegy, Inc.**

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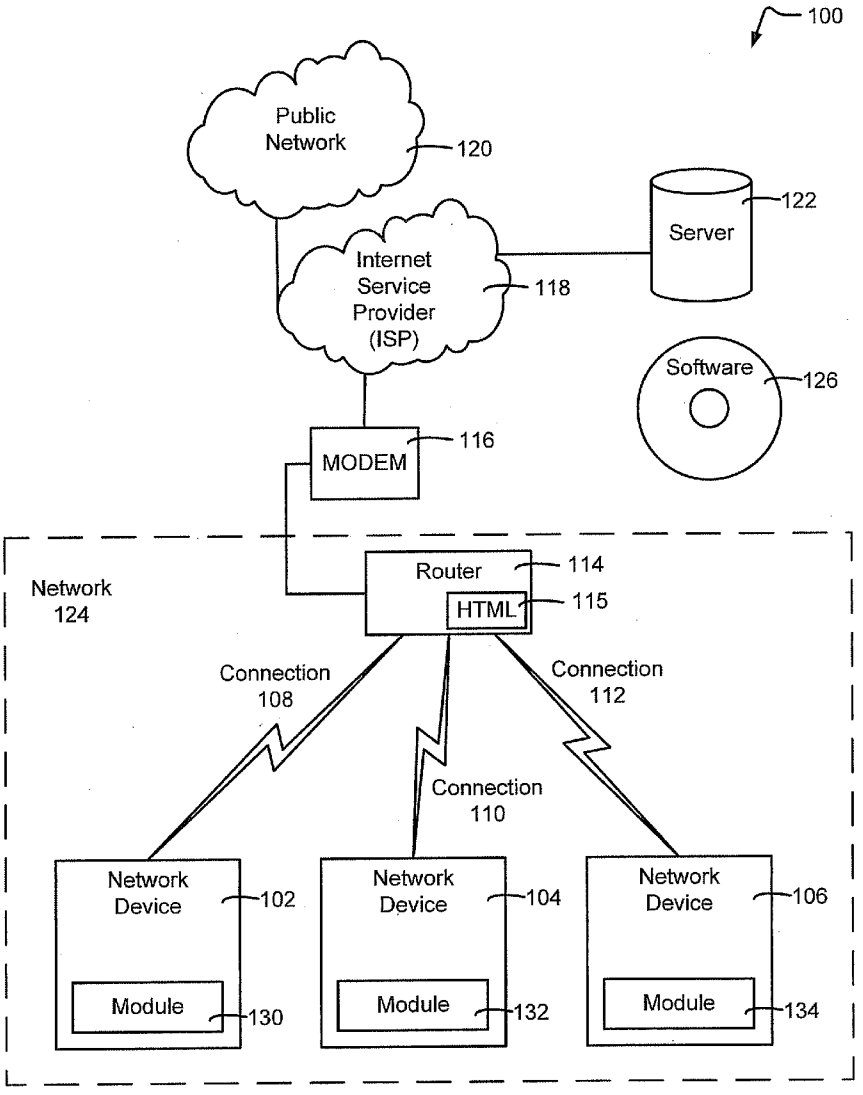
(57) **ABSTRACT**

Methods and systems for configuring a network are provided. A method may include monitoring properties of a connection between a network device and a network. The method may also include detecting a change in the properties of the connection. The method may also include verifying the connection to the network is provided by a service provider when the change in the properties is detected and providing network configuration options based on the change.



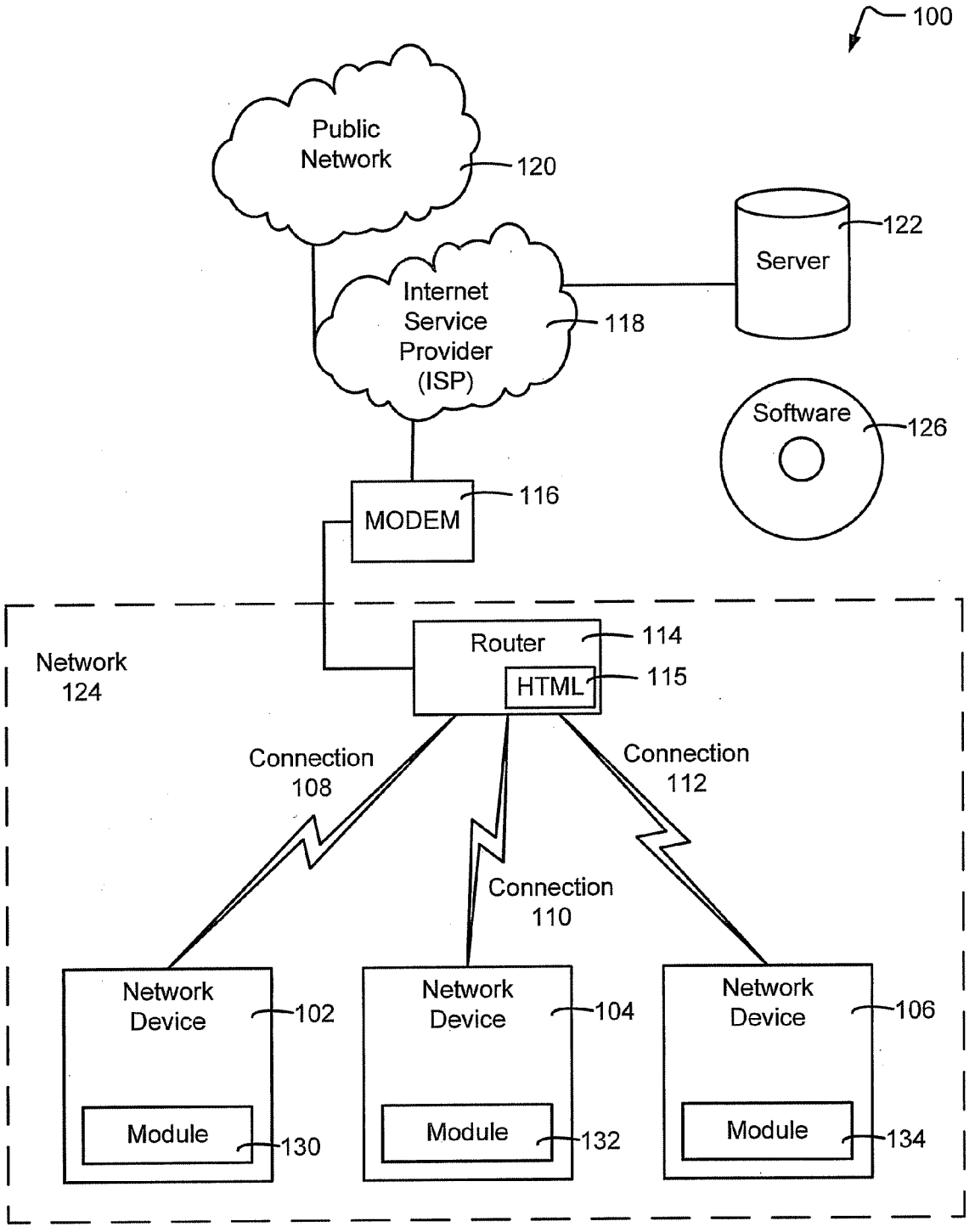

100
Public Network
120
Server
122
Internet Service Provider (ISP)
118
Software
126
MODEM
116
Network 124
Router
114
HTML
115
Connection 108
Connection 110
Connection 112
Network Device
102
Network Device
104
Network Device
106
Module
130
Module
132
Module
134

FIG. 1

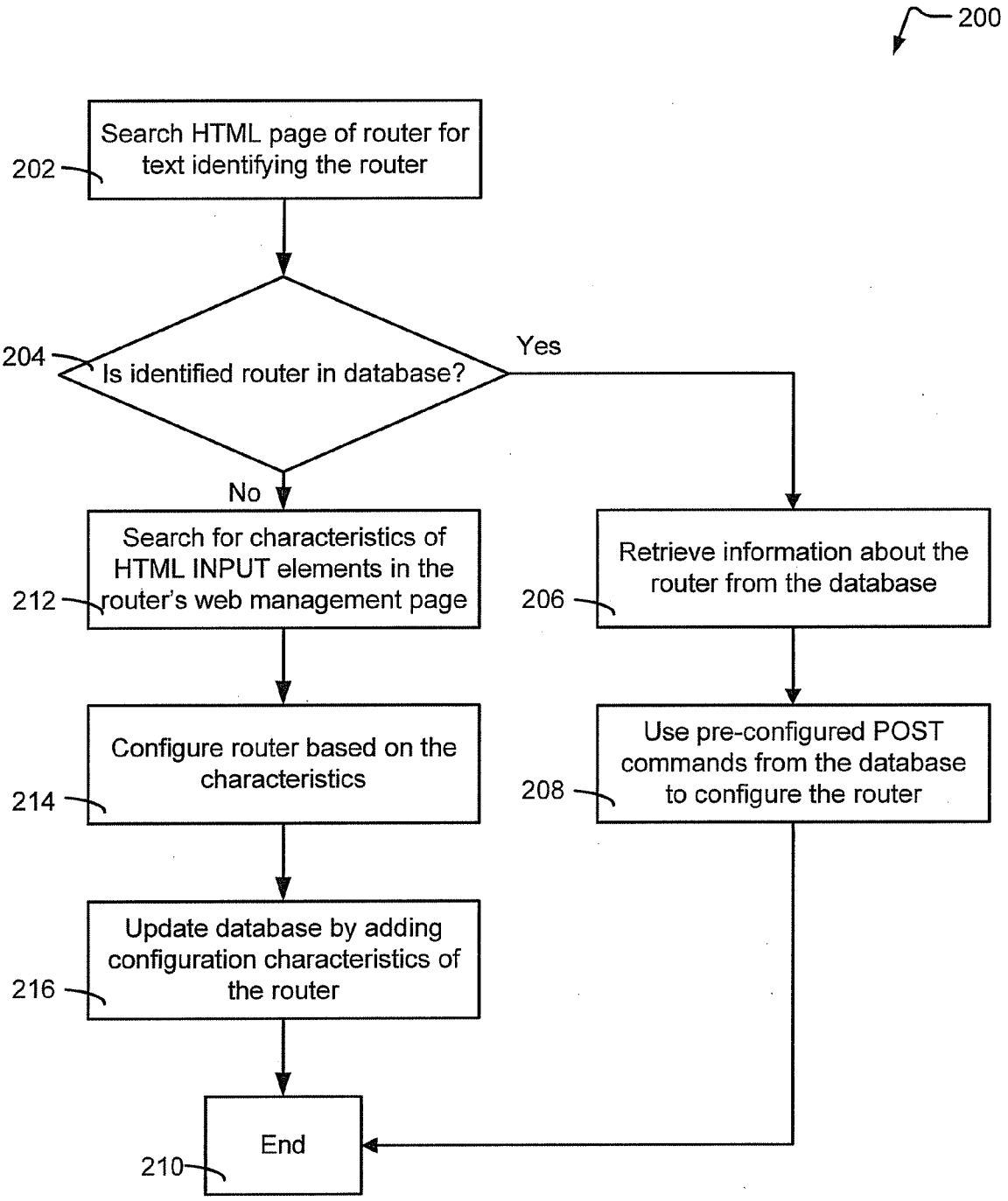

200
Search HTML page of router for text identifying the router
202
Is identified router in database?
204
Yes
No
Retrieve information about the router from the database
206
Use pre-configured POST commands from the database to configure the router
208
Search for characteristics of HTML INPUT elements in the router's web management page
212
Configure router based on the characteristics
214
Update database by adding configuration characteristics of the router
216
End
210

FIG. 2

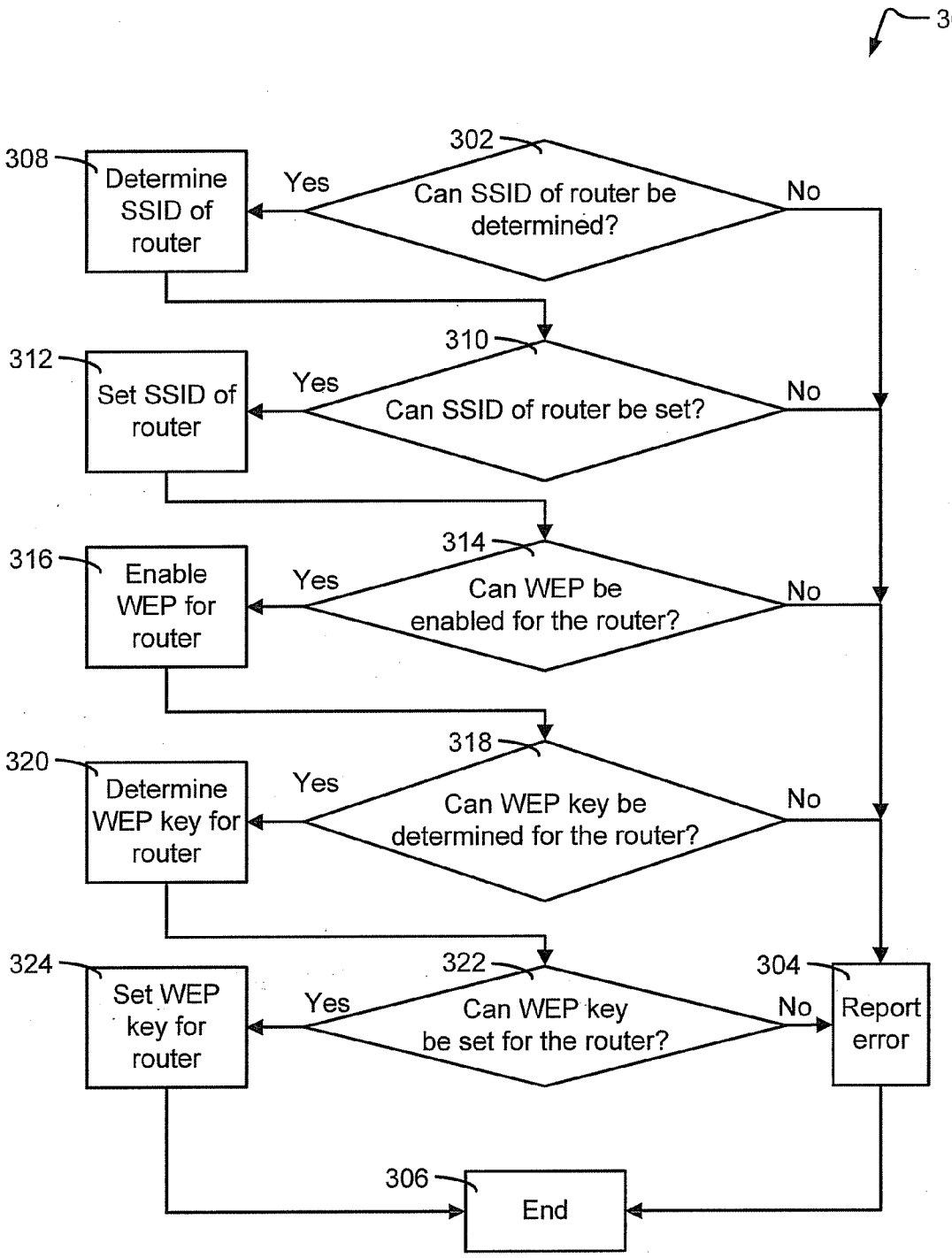

300
302
Can SSID of router be determined?
Yes
No
308
Determine SSID of router
310
Can SSID of router be set?
Yes
No
312
Set SSID of router
314
Can WEP be enabled for the router?
Yes
No
316
Enable WEP for router
318
Can WEP key be determined for the router?
Yes
No
320
Determine WEP key for router
322
Can WEP key be set for the router?
Yes
No
324
Set WEP key for router
304
Report error
306
End

FIG. 3

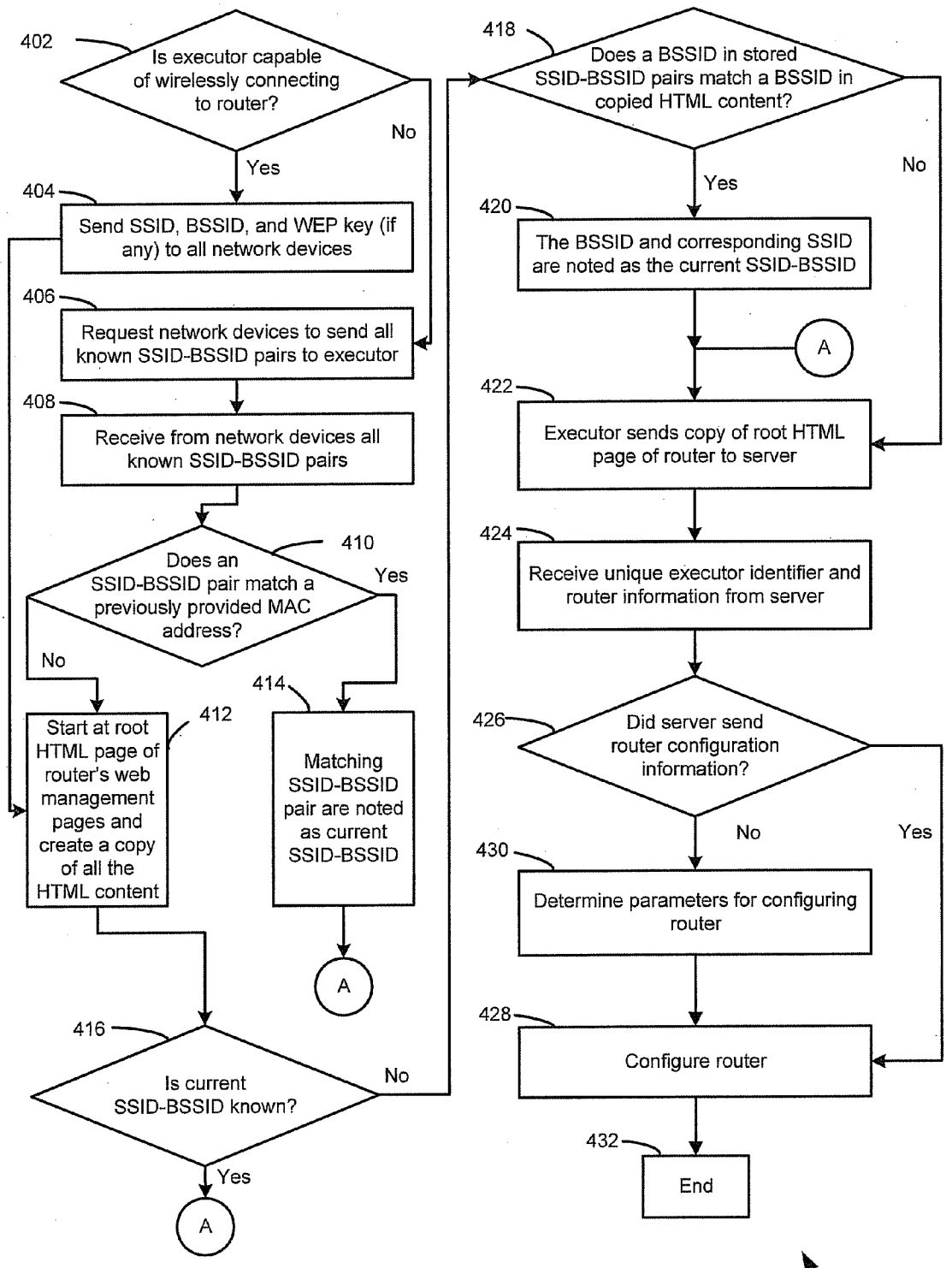

402
Is executor capable of wirelessly connecting to router?
No
Yes
404
Send SSID, BSSID, and WEP key (if any) to all network devices
406
Request network devices to send all known SSID-BSSID pairs to executor
408
Receive from network devices all known SSID-BSSID pairs
410
Does an SSID-BSSID pair match a previously provided MAC address?
Yes
No
412
Start at root HTML page of router's web management pages and create a copy of all the HTML content
414
Matching SSID-BSSID pair are noted as current SSID-BSSID
A
416
Is current SSID-BSSID known?
No
Yes
A
418
Does a BSSID in stored SSID-BSSID pairs match a BSSID in copied HTML content?
Yes
No
420
The BSSID and corresponding SSID are noted as the current SSID-BSSID
A
422
Executor sends copy of root HTML page of router to server
424
Receive unique executor identifier and router information from server
426
Did server send router configuration information?
No
Yes
430
Determine parameters for configuring router
428
Configure router
432
End
400

FIG. 4

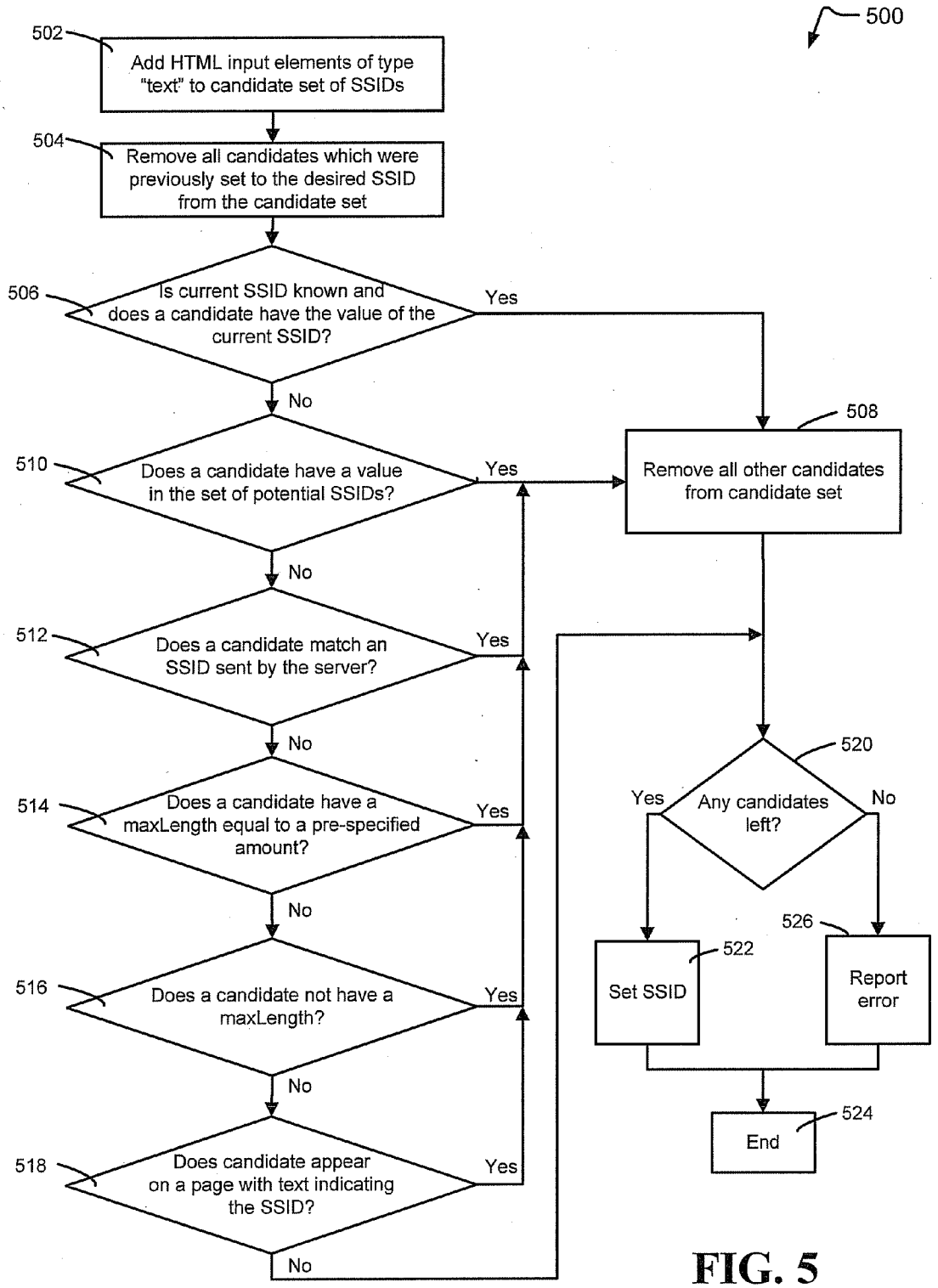

500
502
Add HTML input elements of type "text" to candidate set of SSIDs
504
Remove all candidates which were previously set to the desired SSID from the candidate set
506
Is current SSID known and does a candidate have the value of the current SSID?
Yes
No
508
Remove all other candidates from candidate set
510
Does a candidate have a value in the set of potential SSIDs?
Yes
No
512
Does a candidate match an SSID sent by the server?
Yes
No
514
Does a candidate have a maxLength equal to a pre-specified amount?
Yes
No
516
Does a candidate not have a maxLength?
Yes
No
518
Does candidate appear on a page with text indicating the SSID?
Yes
No
520
Any candidates left?
Yes
No
522
Set SSID
526
Report error
524
End

FIG. 5

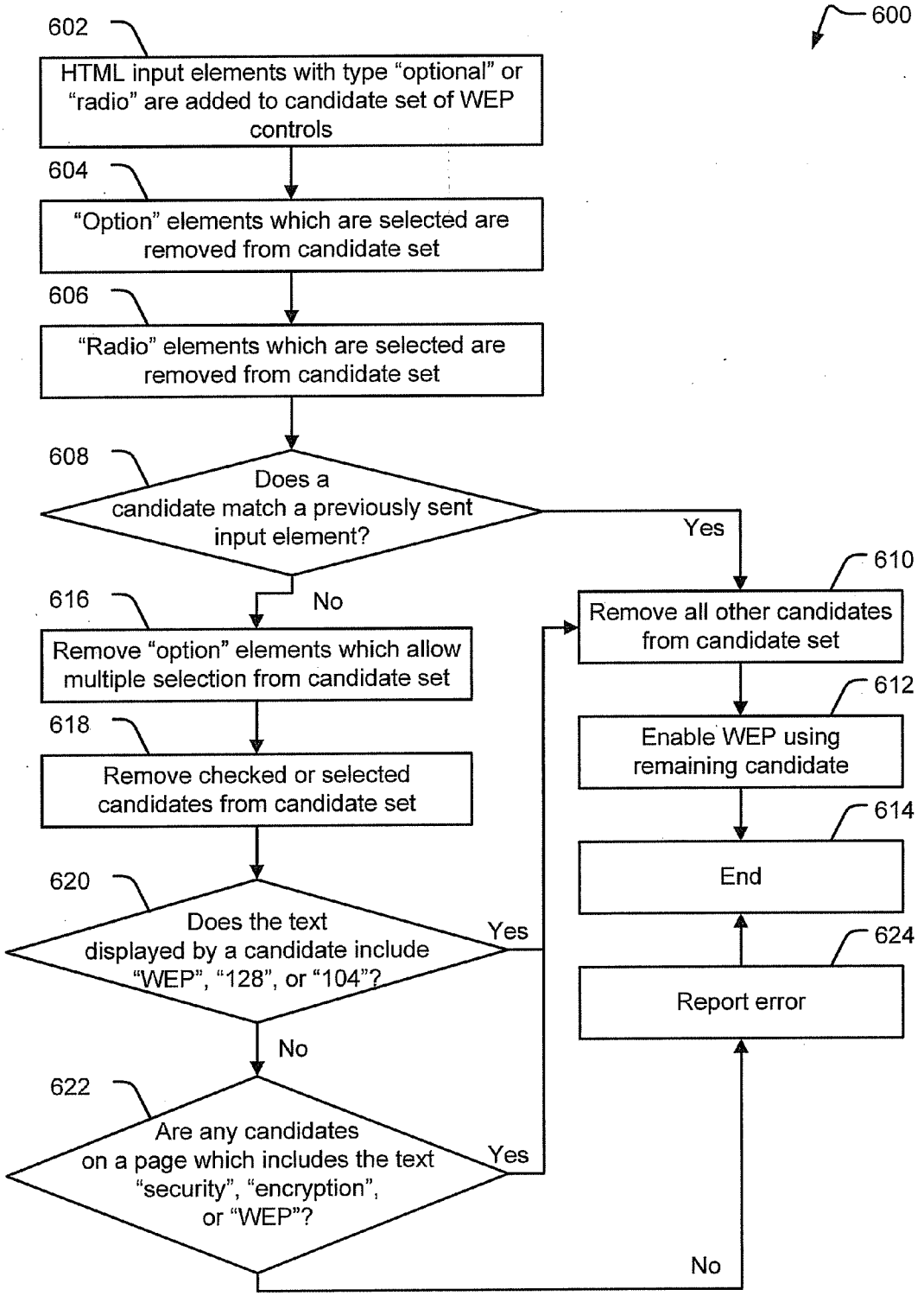

600
602
HTML input elements with type "optional" or "radio" are added to candidate set of WEP controls
604
"Option" elements which are selected are removed from candidate set
606
"Radio" elements which are selected are removed from candidate set
608
Does a candidate match a previously sent input element?
Yes
No
610
Remove all other candidates from candidate set
612
Enable WEP using remaining candidate
614
End
616
Remove "option" elements which allow multiple selection from candidate set
618
Remove checked or selected candidates from candidate set
620
Does the text displayed by a candidate include "WEP", "128", or "104"?
Yes
No
622
Are any candidates on a page which includes the text "security", "encryption", or "WEP"?
Yes
No
624
Report error

FIG. 6

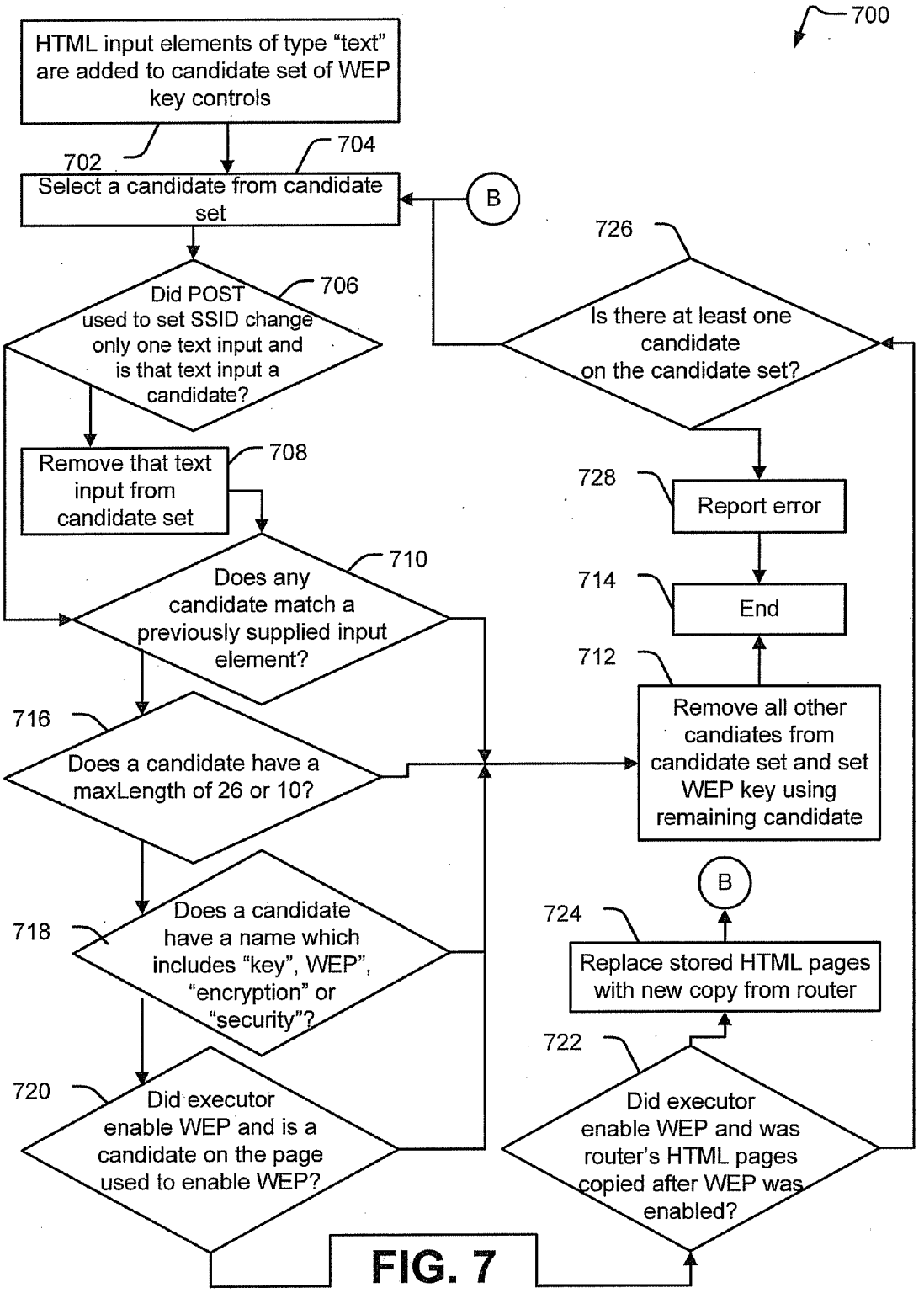

700
HTML input elements of type "text" are added to candidate set of WEP key controls
702
704
Select a candidate from candidate set
B
726
Did POST used to set SSID change only one text input and is that text input a candidate?
706
Is there at least one candidate on the candidate set?
Remove that text input from candidate set
708
728
Report error
Does any candidate match a previously supplied input element?
710
714
End
712
716
Remove all other candiates from candidate set and set WEP key using remaining candidate
Does a candidate have a maxLength of 26 or 10?
B
Does a candidate have a name which includes "key", WEP", "encryption" or "security"?
718
724
Replace stored HTML pages with new copy from router
722
720
Did executor enable WEP and is a candidate on the page used to enable WEP?
Did executor enable WEP and was router's HTML pages copied after WEP was enabled?

FIG. 7

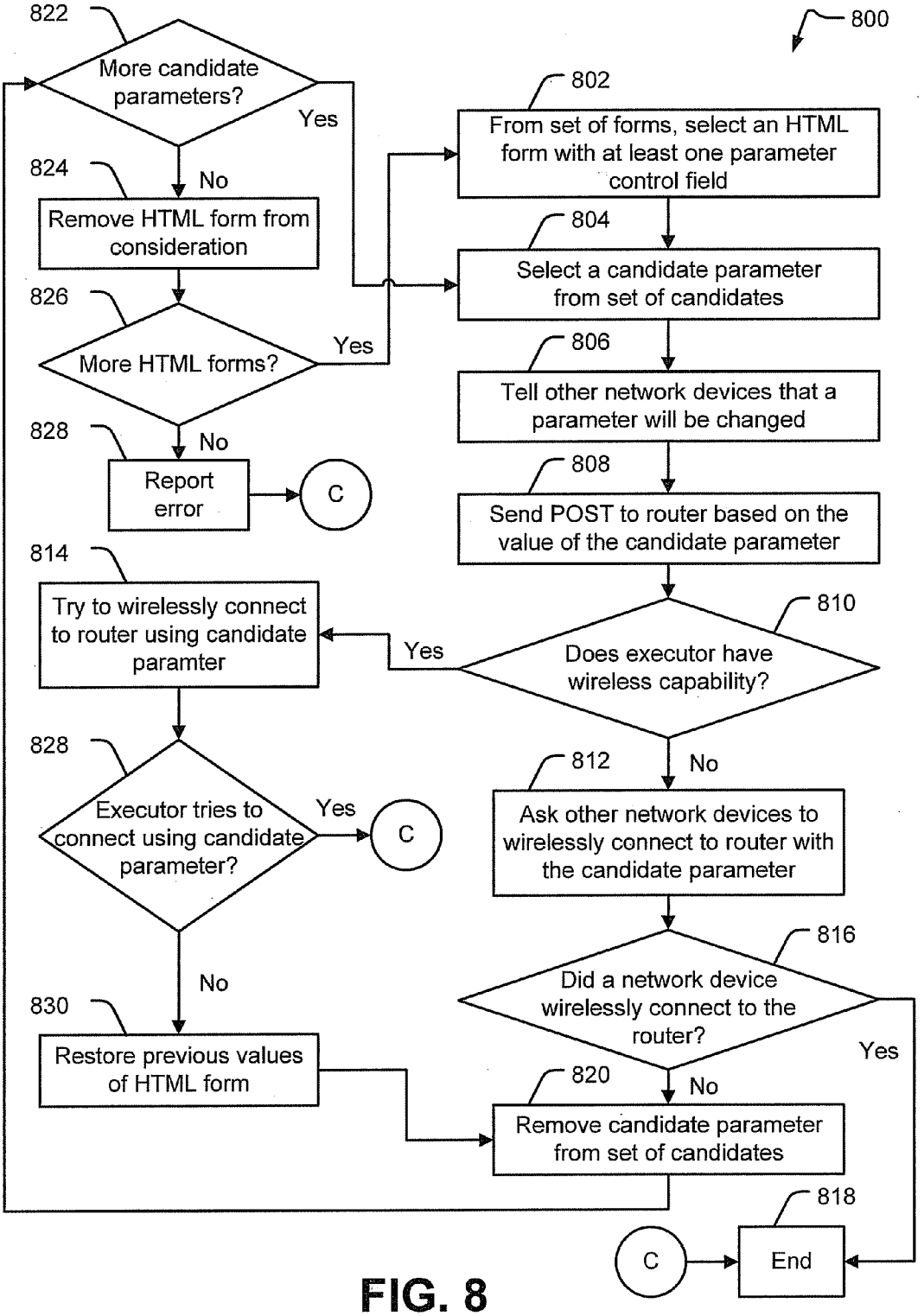

800
822
More candidate parameters?
Yes
No
824
Remove HTML form from consideration
826
More HTML forms?
Yes
No
828
Report error
C
802
From set of forms, select an HTML form with at least one parameter control field
804
Select a candidate parameter from set of candidates
806
Tell other network devices that a parameter will be changed
808
Send POST to router based on the value of the candidate parameter
810
Does executor have wireless capability?
Yes
No
814
Try to wirelessly connect to router using candidate paramter
828
Executor tries to connect using candidate parameter?
Yes
C
No
830
Restore previous values of HTML form
812
Ask other network devices to wirelessly connect to router with the candidate parameter
816
Did a network device wirelessly connect to the router?
Yes
No
820
Remove candidate parameter from set of candidates
818
C
End

FIG. 8

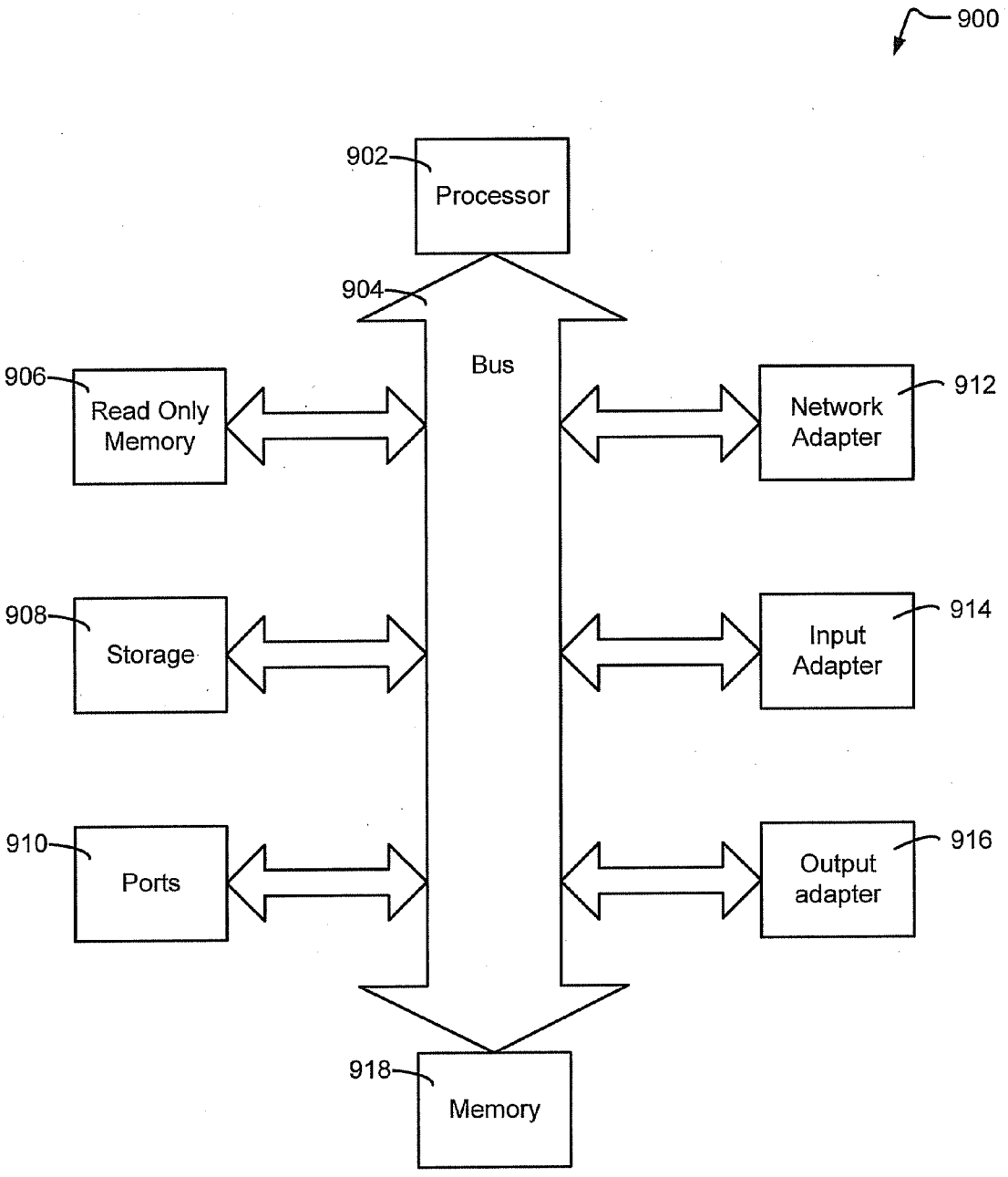

900
902
Processor
904
Bus
906
Read Only Memory
912
Network Adapter
908
Storage
914
Input Adapter
910
Ports
916
Output adapter
918
Memory

FIG. 9

SYSTEM AND METHOD FOR CONTROLLING AND CONFIGURING A ROUTER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from U.S. Provisional Patent Application No. 61/076,205 filed on Jun. 27, 2008 and entitled "SYSTEM AND METHOD FOR CONTROLLING AND CONFIGURING A ROUTER."

FIELD OF THE DISCLOSURE

[0002] The present disclosure is generally related to wireless networks and to controlling and configuring a router.

BACKGROUND

[0003] A home or small business may have a network to allow access to an external network. The network may be accessed using one or more network devices, such as a personal computer, a laptop, a phone, or a personal digital assistant (PDA). Often, each network device may be capable of communicating with another network device using a wired protocol or a wireless protocol. An example of a wired protocol is Ethernet. Examples of wireless protocols include IEEE 802.11 ("Wi-Fi"), Bluetooth, Wireless Universal Serial Bus (USB), Code Division Multiple Access (CDMA), and Global System Mobile (GSM).

[0004] In order to allow a network device in the home or small business to communicate with an external network, such as the Internet, a wireless router may be used to set up a wireless network, such as a Wi-Fi network. The wireless router may also be known as a wireless access point. The wireless router may have a wired connection to an external network, such as the Internet, and may broadcast a wireless signal to allow wireless-capable network devices access to the external network.

[0005] Configuring the wireless network to secure the network may include manually enabling and manually setting the wireless router's security settings. Also, each network device's access settings may be manually enabled and manually set. The process of manually enabling and manually setting the wireless router's security settings may be quite complex, making the process frustrating for users, especially for those who are not technically savvy. Therefore, there is a need for an improved system and method for controlling and configuring a router.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** is a block diagram of an embodiment of a wireless network and a system to control and configure a router;

[0007] FIG. **2** is a flow chart of a first illustrative embodiment of a method of controlling and configuring a router;

[0008] FIG. **3** is a flow chart of a second illustrative embodiment of a method of controlling and configuring a router;

[0009] FIG. **4** is a flow chart of a third illustrative embodiment of a method of controlling and configuring a router; and

[0010] FIG. **5** is a flow chart of a fourth illustrative embodiment of a method of controlling and configuring a router; and

[0011] FIG. **6** is a flow chart of a fifth illustrative embodiment of a method of controlling and configuring a router;

[0012] FIG. **7** is a flow chart of a sixth illustrative embodiment of a method of controlling and configuring a router;

[0013] FIG. **8** is a flow chart of a seventh illustrative embodiment of a method of controlling and configuring a router; and

[0014] FIG. **9** is a block diagram of an illustrative embodiment of a network device.

DETAILED DESCRIPTION OF THE DRAWINGS

[0015] In a particular embodiment, a method may include identifying a first network device in communication with a computer via a network. The method may include searching a library of network device commands at the computer for commands that are associated with the first network device. The method may also include determining at the computer a set of commands that are executable by the first network device. The method may also include sending at least one control command from the computer that is executable by the first network device to configure the first network device.

[0016] In a particular embodiment, a system may include a processor and a memory that is accessible to the processor. The memory may include instructions that are executable by the memory to detect a network device that is accessible to the computer via a network. The memory may also include instructions that are executable by the memory to probe a network management interface of the network device via the network. The memory may also include instructions that are executable by the memory to determine a set of commands that are executable by the network device to configure the network device. The memory may also include instructions that are executable by the memory to store the set of commands in a library of network device commands.

[0017] In a particular embodiment, a computer readable medium may include computer readable instructions executable by a processor to record user input at a computer. The user input may correspond to configuration commands that are executable by a network device that is in communication with the computer via a network. The computer readable instructions may also be executable by a processor to generate a set of the configuration commands. The computer readable instructions may also be executable by a processor to store the set of configuration commands to a library of network device commands.

[0018] FIG. **1** is an illustrative embodiment of a network **100**. In the network **100**, network devices **102**, **104**, and **106** connect via connections **108**, **110**, and **112** to router **114**. Each of the network devices **102-106** may be a personal computer, a laptop, a phone, a personal digital assistant (PDA), or any other device capable of connecting to a network. Each of the network devices **102-106** may be capable of communicating with another network device using at a wired protocol, or a wireless protocol. Each connection in the connections **108-112** may be a wired connection or a wireless connection. A wired connection may use a wired protocol, such as Ethernet. A wireless connection may use a wireless protocol, such as Code Division Multiple Access (CDMA), Global System for Mobile (GSM), Bluetooth, Wireless Universal Serial Bus (USB), or IEEE 802.11 ("Wi-Fi").

[0019] The router **114** may be connected via a modem **116** to an Internet Service Provider (ISP) **118**. The ISP **118** may provide access to a public network **120**, such as the Internet. A server **122** may be accessible to ISP **118**. The server **122** may be used to provide software for securing a network, such as the network **124**. The server **122** may also register the

network devices **102-106** belonging to a subscriber of the ISP **118** when securing the network **124**.

[0020] The network devices **102**, **104**, and **106** may have modules **130**, **132**, and **134**, respectively. Each module in the modules **130-134** may be stored in a memory (not shown) and contain instructions capable of being executed by a processor (not shown). Each of the modules **130-134** may be executed by a processor (not shown) to secure the network **124**.

[0021] The network devices **102-106** and the router **114** may be part of a network **124**. In this example, the network **124** is shown with three network devices, the network devices **102-106**. However, the number of network devices in the network **124** may be fewer than three or greater than three. In order to secure the network **124**, a software **126** may be installed on one network device of the network devices **102-106**. For example, the software **126** may be first installed on the network device **102** as the module **130**. The module **130** contains instructions capable of being executed by a processor. In one embodiment, the software **126** may be on a storage device accessible to the network device **102**, such as a Compact Disc Read Only Memory (CD-ROM) or a Universal Serial Bus (USB) memory drive. In another embodiment, the software **126** may be supplied by the ISP **118** and downloaded from the server **122**. If the software **126** is supplied by the ISP **118**, then the server **122** may allow the software **126** to be downloaded only after determining that the router **114** or the modem **116** is owned by a subscriber of the ISP **118**.

[0022] After the software **126** is installed on network device **102** as module **130**, the module **130** may determine the capabilities of network device **102**. For example, the module **130** may determine whether the network device **102** is capable of making a wireless connection with a wireless router, such as the router **114**. The module **130** may also determine whether the router **114** has a private Internet Protocol (IP) address. The module **130** may determine the security features of the router **114**, such as the type of encryption used by the router **114**. For example, the type of encryption for a Wi-Fi network may be Wired Equivalent Privacy (WEP) or Wi-Fi Protected Access (WPA). The module **130** may determine the Service Set IDentifier (SSID) of the router **114**. The module **130** may also determine the Basic Service Set Identifier (BSSID) of the router **114**. In one embodiment, the module **130** may determine whether the router **114** or the modem **116** is owned by a subscriber of the ISP **118**.

[0023] After analyzing the capabilities of the network device **102**, the module **130** may display an indication of the capabilities of the network device **102**. For example, the module **130** may use a traffic light metaphor to graphically indicate the capabilities of the network device **102**. In the traffic light metaphor, a red light may indicate that the network device **102** is not capable of wireless networking; a yellow light may indicate that the network device **102** is wirelessly connected to the router **114**, but that the wireless connection **108** has no security or the security is below a security threshold; and a green light may indicate that the network device **102** is wirelessly connected to the router **114** with an adequate amount of security. The module **130** may also provide a selection mechanism for a user to select whether the user wishes to secure the network **124**. The network **124** may be secured by securing the router **114** and by securing each network device capable of wirelessly connecting to the router **114**.

[0024] After a user indicates that the user wishes to secure network **124**, the module **130** may begin the process of securing the network **124**. For example, the software **126** may be installed on one or more of the network devices **102-106** in the network **124**. An executor may be selected from among the network devices **102-106** using different criteria. The executor may control and configure the router **114**.

[0025] To control and configure the router **114**, the executor may determine the identity of the router **114**. For example, the router may search in a Hypertext Markup Language (HTML) page **115** of the router **114** for text that identifies a manufacturer and model number of the router **114**. If the executor determines the manufacturer and the model number of the router **114**, then the executor may determine a set of HTML commands based on the manufacturer and the model number of the router **114**. In a particular embodiment, the executor may determine the set of HTML commands by retrieving the HTML commands from a database based on the manufacturer and the model number of the router **114**. For example, the set of HTML commands in the database may be a set of POST commands. The set of HTML commands is one or more HTML commands. Each HTML command may submit data for the router **114** to process.

[0026] The set of HTML commands may be used to configure the router **114**. The database may be part of the software **126**. Additionally, the database may be in one of the modules **130-134**. Additionally, the database may be at the server **122**. The database may also contain a default username and/or a default password used with the set of HTML commands to configure the router **114**. If the executor is not able to access the router **114** with the default username and/or password, the executor may prompt the user to enter a user name and password.

[0027] If the identity of the router **114** is not in the database, then the executor may attempt to determine the commands used to configure the router **114**. For example, the executor may search for characteristics of HTML INPUT elements in web management pages of the router **114**. A router manufacturer may provide web management pages for use in configuring the router **114**. The web management pages may be used to accept input, using HTML INPUT elements, from a user in order to configure the router **114**. The executor may analyze the web management pages of the router **114** to determine how to configure the router **114**.

[0028] If the executor is wirelessly connected to the router, then the current SSID, BSSID, and WEP key may be determined and sent to the network devices **102-106**. If the executor is not wirelessly connected to the router, then the executor may send a request to the network devices **102-106**, asking for a set of known SSID-BSSID pairs. Each of the network devices **102-106** may respond by sending the executor a set of known SSID-BSSID pairs. The executor may receive the set of known SSID-BSSID pairs from each of the network devices **102-106**, combine each set of known SSID-BSSID pairs into a combined set of known SSID-BSSID pairs, and then store the combined set of known SSID-BSSID pairs. The executor may ask the user to enter a MAC address. The executor may determine whether the MAC address entered by the user matches one of the BSSIDs in the combined set of known SSID-BSSID pairs. If the MAC address entered by the user matches one of the BSSIDs in the combined set of known SSID-BSSID pairs, then the corresponding SSID-BSSID pair may be used to configure the router **114**.

[0029] The executor may start at the root HTML page of the router **114**, and follow links, such as the <a>, <iframe>, and <frame> links in the HTML web management pages of the

router **114**, copying some or all of the HTML content in the HTML web management pages of the router **114**. During this process, the executor may ignore some or all of the non-HTML content. If the executor has not yet identified the SSID of the router **114**, then if a BSSID found in the copied HTML content matches one of the BSSIDs in the combined set of known SSID-BSSID pairs, then the corresponding SSID-BSSID pair may be used to configure the router **114**. If the executor is unsuccessful in accessing the router **114** using information found at a specific HTML page in the copied HTML content, then the HTML page maybe added to a set of HTML pages which did not contain information relevant to configuring the router **114**.

[0030] The executor may send a copy of the root HMTL page of the router **114** to the server **122** and request the server **122** to determine if the root HTML page of the router **114** matches an entry in a database of router configuration information at the server **122**. If the server **122** determines that the root HTML page of the router **114** matches an entry in the database of router configuration information at the server **122**, then the server **122** may send configuration data for the router **114** from the database of router configuration information to the executor. The server **122** may also send to the network devices **102-106** a unique identifier, such as a unique number, identifying the executor.

[0031] The executor may set the SSID of the router **114**. Before setting the SSID for the router **114**, the executor may first create a set of SSID candidates. If the executor has a previous set of candidate SSIDs, the previous candidate SSIDs may be removed from the set of candidate SSIDs. In the copied HTML content of the router **114**, each HTML input element with a type of "text" may be added as a candidate SSID. If the executor does not find any candidate SSIDs, then a user may be notified that the executor was unable to find a candidate SSID. If the executor knows the current SSID of the router **114** by means of a current wireless connection to the router, and the current SSID matches a candidate SSID on the set of candidate SSIDs, then the current SSID may be used, and all other candidate SSIDs may be removed from the set of candidate SSIDs.

[0032] If the executor determines that a candidate SSID has a value that is in the set of potential SSIDs, then all other candidate SSIDs may be removed from the set of candidate SSIDs. The set of potential SSIDs is determined from a database of known SSIDS for routers. If the executor determines that a candidate SSID matches an SSID received from the server **122**, then all other candidate SSIDs may be removed from the set of candidate SSIDs. If the executor determines that the length of a candidate SSID is less than or equal to a previously specified size, then all other candidate SSIDs may be removed from the set of candidate SSIDs. For example, if the previously specified size is thirty-two characters, then any candidate SSID with a length of thirty-two characters or less may be selected as the SSID for the router **114**. The HTML maxLength command may be used to determine the length of a candidate SSID. If the executor determines that a candidate SSID appears on a page of the copied HTML content which also contains a text field including the letters "SSID", "service set identifier", or "service set id", in any combination of upper or lowercase letters, then all other candidate SSIDs may be removed from the set of candidate SSIDs.

[0033] Each time the executor finds a candidate SSID in the copied HTML content of the router **114**, the executor may send a message to the network devices **102-106** identifying the candidate SSID and informing the network devices **102-106** that the executor is attempting to access the router using the candidate SSID. The executor may send an HTML command, such as a POST command, to the router **114**. For example, the executor may send a POST command containing the candidate SSID to the router **114**. If the executor is capable of connecting to a wireless network, then the executor may store the state of the wireless connection and attempt to wirelessly connect to the router **114** using the candidate SSID. If the executor determines that the router **114** is using an encryption protocol, such as Wired Equivalent Privacy (WEP), the executor may attempt to connect to the router **114** using the encryption protocol. If the executor is able to connect to the router **114**, then the executor may configure the router **114**. If the executor is not able to connect to the router **114**, then the executor may restore the stored state of the wireless connection.

[0034] If the executor is not capable of connecting to a wireless network then one or more of the network devices **102-106** may be instructed to attempt to access the router **114**. If one of the network devices **102-106** is able to access the router **114**, then the network device that is accessing the router **114** may send a message to the executor that it was successful in connecting to the router **114**. The network device accessing the router **114**, or the executor which receives the message, may set the SSID of the router **114**. If the router uses an encryption protocol, such as Wired Equivalent Privacy (WEP), then the network device that is accessing the router **114** may send the executor a message containing information about the encryption protocol being used by the router **114**, such as the type of encryption protocol being used, or the security key being used for the encryption protocol.

[0035] If the executor receives a message that one of the network devices **102-106** was able to access the router **114**, then the executor may enable an encryption protocol, such as WEP. For example, the executor may search copied HTML content for HTML input elements, and any HTML input elements of type "option" or "radio" may be considered as candidate WEP controls. Any "option" HTML input element which is selected or checked may be removed from consideration as candidate WEP controls. If any candidate HTML input elements match HTML input elements previously sent by the server **122**, then the matching HTML input elements may be selected as the candidate WEP controls and all other candidates may be removed from consideration. Any "option" HTML input element within a "select" HTML input element may be removed from consideration.

[0036] If any candidate HTML input elements display text which includes "WEP" then all other HTML input elements may be removed from consideration as candidate WEP controls. If any candidate HTML input elements display text which includes "128" then all other HTML input elements may be removed from consideration as candidate WEP controls. If any candidate HTML input elements display text which includes "104" then all other HTML input elements may be removed from consideration as candidate WEP controls. If any candidate HTML input elements display text which includes "security" then all other HTML input elements may be removed from consideration as candidate WEP controls. If any candidate HTML input elements display text which includes "encryption" then all other HTML input elements may be removed from consideration as candidate WEP controls. If there are no candidate WEP candidates, the user may be notified that WEP could not be set for the router **114**.

[0037] If there are one or more WEP candidates, then the executor may select a WEP candidate and attempt to set WEP encryption for the router **114** using the selected WEP candidate. After the executor selects a WEP candidate, the executor may notify the network devices **102-106** that the executor is experimentally enabling WEP. The executor may send a POST command based on the selected WEP candidate to the router **114**. If the POST command based on the selected WEP candidate sets the WEP encryption for the router **114**, then WEP encryption may be enabled for the router **114**. If the POST command based on the selected WEP candidate does not set the WEP encryption for the router **114**, then the selected WEP candidate may be removed from consideration, another WEP candidate may be selected, and the previous process may be repeated until WEP is enabled for the router **114** or there are no more candidates.

[0038] If the executor is capable of wirelessly connecting to the router **114**, then the executor may attempt to connect to the router **114** using WEP. If the executor is able to connect to the router **114** using WEP, then WEP has been enabled for the router **114** and the executor may set the WEP key. If the executor is unable to connect to the router **114** using WEP, then the executor may attempt to connect to the router **114** without using WEP. If the executor is unable to connect to the router **114** without using WEP, the executor determines if the executor is capable of connecting to the router **114** using a wired connection. If the executor determines that the executor is capable of connecting to the router **114** using a wired connection, then the executor may connect to the router **114** using the wired connection.

[0039] If the executor determines that the executor is not capable of connecting to the router **114** using a wired connection, then the executor may display a message instructing the user to connect the executor to the router **114** using a wired connection. If the executor is not capable of wirelessly connecting then the executor may instruct one or more of the network devices **102-106** to attempt to wirelessly connect to the router **114**. If one of the network devices **102-106** is able to wirelessly connect to the router **114**, then the network device that is wirelessly connecting to the router **114** may send a message to the executor that it was successful in connecting to the router **114**.

[0040] The network device which is accessing the router **114** may send the executor a message containing information, such as whether the network device was able to access the router **114** with WEP enabled or whether the network device was able to access the router **114** with WEP disabled. The network device connecting to the router **114**, or the executor which receives the message, may set WEP for the router **114**. If none of the network devices **102-106** are able to connect to the router **114**, with or without WEP enabled, then a POST command may be sent to the router **114** to set the values back to the previous values, a new candidate WEP is chosen, and the above process may be repeated.

[0041] After setting WEP for the router **114**, the executor may set the WEP key. For example, the executor may search the copied HTML content of the router **114** for HTML input elements, and any HTML input elements of type "text" may be considered as a candidate WEP key. If the POST command used to set the SSID changed only one text input, and that input is a candidate WEP key, then the candidate WEP key may be removed from consideration as a candidate.

[0042] If a candidate WEP key matches an HTML input element previously sent by the server **122**, then the matching HTML input elements may be selected as the candidate WEP and all other candidates may be removed from consideration. If no candidate WEP keys has a length of ten or twenty-six characters and the executor was able to enable WEP, then the executor may replace the copied HTML page with a new copy from the router. The executor may search the copied HTML content for HTML input elements and any HTML input elements of type "text" may be considered as a candidate WEP key.

[0043] The HTML maxLength command may be used to determine the length of a candidate WEP key. Any candidate that does not have a length of ten or twenty-six characters may be removed from consideration as a candidate. If there are no candidate WEP keys then the user may be advised that no candidate WEP keys are available. If any candidate WEP key has a length of twenty-six characters, then all other candidates may be removed from consideration as a candidate. If any candidate WEP key has a length of ten characters, then all other WEP key candidates may be removed from consideration.

[0044] If any candidate WEP key is associated with an HTML field containing the text "WEP", "key", "security" or "encryption", in any combination of upper or lowercase letters, then all other WEP key candidates may be removed from consideration. If the executor was able to enable WEP for the router **114** and if a WEP key candidate is on the same HTML web management page which successfully enabled WEP, then all other WEP key candidates may be removed from consideration.

[0045] For each page of the copied HTML content that contains at least one candidate WEP key, the executor may attempt to set the WEP key for the router **114**. If the executor previously enabled WEP, and the HTML page used to enable WEP did not change after the executor enabled WEP, the executor may obtain a new copy of the HTML web management page from the router **114** and replace the copied HTML web management page with the new copy of the HTML web management page.

[0046] The executor may send a message to the network devices **102-106** indicating that the executor is attempting to set the WEP key for the router **114**. For each candidate WEP key, the executor may send a POST command, based on the candidate WEP key, to the router **114**. For example, a candidate WEP key with a length of ten characters may be sent in a POST command in an American Standard Code for Information Interchange (ASCII) based format. A candidate WEP key that has a length different than ten characters may be sent in a POST command in a twenty-six digit, hexadecimal-based, format.

[0047] If the executor previously set the SSID or enabled WEP, one or more of the values used to set the SSID or enable WEP may be sent, along with the candidate WEP key, in a POST command. If the executor is not able to use a page using the candidate WEP key, then that candidate WEP key may be removed from consideration. If the executor is capable of wirelessly connecting to the router **114**, then the executor attempts to connect to the router **114** based on the previously set SSID and based on the candidate WEP key. If the executor is successful in connecting to the router **114** using the previously set SSID and the candidate WEP key, then the executor has set the WEP key for the router **114** and the executor may execute a cleanup process. If the executor is successful in

connecting to the router **114** using the previously set SSID and the candidate WEP key, then the executor may attempt to reconnect to the router **114**.

[0048] The executor may attempt to reconnect to the router **114** by using a previous WEP key, if known, or without WEP. If the executor is capable of connecting to the router **114** using a wired connection, then the executor may send a POST command to the router **114** to restore the values which were in the router **114** prior to the executor trying the candidate WEP key. If the executor cannot connect to the router **114**, then the executor may display a message asking the user to connect the executor to the router **114** using a wired connection. If the executor determines the executor is capable of connecting to the router **114** using the wired connection, then the executor may send a POST command to the router **114** to restore the values which were in the router **114** prior to the executor trying the candidate WEP key.

[0049] If the executor is not capable of wirelessly connecting to the router **114** then the executor may instruct one or more of the network devices **102-106** to attempt to wirelessly connect to the router **114** using the previously set SSID) and the candidate WEP key. If the network devices **102-106** are all not able to wirelessly connect to the router **114** using the previously set SSID and the candidate WEP key, then the network devices **102-106** may reestablish any previous connectivity to the router **114** and may notify the executor that none of them was successful.

[0050] If one of the network devices **102-106** is able to connect to the router **114** using the previously set SSID and the candidate WEP key then that network device may notify the executor that the network device was successful, and notifies the executor of the SSID and WEP key used to connect to the router **114**. If the executor receives a message indicating that one of the network devices **102-106** was able to connect to the router **114** using the previously set SSID and the candidate WEP key, then the executor may execute a cleanup process.

[0051] The executor may execute a cleanup process which cleans up any changes made to the router **114** which did not contribute to setting the router **114**. For each page of copied HTML content, the executor may get one or parameters from the router **114**. The executor may then send a message to the network devices **102-106** notifying them that one or more parameters may revert back to previous values. The executor may send a POST command to the router **114**. For example, the POST command may contain parameters that were successfully used to set the SSID, enable WEB, or set the WEP key, or the POST command may contain the original parameters found in the copied HTML content. If the executor does not have a wired connection to the router **114**, and the executor is not able to reconnect to the router **114**, the executor may try to connect to the router **114** with WEP and without WEP, using the value of each text input that the executor changes as a potential SSID and WEP key. If the executor is unsuccessful in wirelessly connecting to the router **114**, then executor may display a message asking the user to connect the executor to the router **114** using a wired connection. If any computers are not able to reconnect to the router **114**, then the POST command sent by the executor to the router **114** may contain any previously used parameters.

[0052] If the executor is successful in configuring the router **114** by setting the SSID, enabling WEP, and setting the WEP key, then the executor may store the HTML input elements, including the form and page they were found in, in a database. For example, the executor may send the HTML input elements to the server **122**, and the server **122** may store the HTML input elements in a database for use in configuring other similar routers.

[0053] After the executor determines that the router **114** may be accessed, the executor device may ask the user if the user wishes to secure the network **124**. If the executor determines that the user wishes to secure the network **124**, then a message may be sent to all the network devices **102-106** indicating that the network **124** will be secured. The executor may configure the router **114** for providing a secure wireless network. The non-executor network devices may also modify their wireless network access settings based on the message.

[0054] After the network **124** is secured, each of the modules **130-134** in the network devices **102-106**, respectively, may actively monitor and maintain the connections **108-112** to the router **114**. For example, when the network device **106** is powered on or re-started, the module **134** may be executed by a process to monitor, configure, and/or maintain the connection **112** with router **114**.

[0055] Referring to FIG. **2**, a flow chart of a first illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **200**. The method **200** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**.

[0056] The method **200** may include searching the HTML page of a router for text identifying the router, at **202**. For example, the router may be a router, such as the router **114** in FIG. **1**. The method may include determining whether the identified router is in a database, at **204**. For example, one of the network devices **102-106** may ask a server, such as server **122** in FIG. **1**, to determine whether the identified router is in a database.

[0057] The database may be located on a server, such as the server **122**, or the database may be located in software, such as the software **126**, or in a module, such as one of modules **130-134**. The database may contain information about configuration characteristics of different routers.

[0058] If the identified router is in the database, then information about the router may be retrieved from the database, at **206**, pre-configured POST commands from the retrieved information may be used to configure the router, at **208**, and the method may end, at **210**. If the router is not in the database, then the router's web management pages may be searched for characteristics of HTML input elements, at **212**.

[0059] The router may be configured based on the characteristics of the HTML input elements, at **214**. The database may be updated by adding the configuration characteristics of the router to the database, at **214**. The method may end, at **210**.

[0060] Referring to FIG. **3**, a flow chart of a second illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **300**. The method **300** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**.

[0061] The method **300** may include determining whether the SSID of the router can be determined, at **302**. The router may be a router, such as the router **114** in FIG. **1**. If the SSID of the router cannot be determined then the error may be reported, at **304**, and the method may end, at **306**. For example, the error may be reported to a user or a subscriber. If

the SSID of the router can be determined, then the SSID of the router may be determined, at **308**. A determination may be made whether the SSID of the router can be set, at **310**. If the SSID of the router cannot be set, then the error may be reported to the user, at **304**, and the method may end, at **306**. If the SSID of the router can be set, then the SSID of the router may be set, at **312**.

[0062] A determination may be made whether WEP can be enabled for the router, at **310**. If WEP cannot be enabled for the router, then the error may be reported to the user, at **304**, and the method may end, at **306**. If WEP can be enabled for the router, then WEP may be enabled for the router, at **316**.

[0063] A determination may be made whether the WEP key can be determined, at **318**. If the WEP key cannot be determined for the router, then the error may be reported to the user, at **304**, and the method may end, at **306**. If the WEP key can be determined, then the WEP key may be determined, at **320**.

[0064] A determination may be made whether the WEP key can be set for the router, at **322**. If the WEP key cannot be set for the router, then the error may be reported to the user, at **304**, and the method may end, at **306**. If the WEP key can be set for the router, then the WEP key may be set for the router, at **324**, and the method may end, at **306**.

[0065] Referring to FIG. **4**, a flow chart of a third illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **400**. The method **400** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**. The software module may, for example, be software, such as software **126**, installed on a network device, such as network device **102**.

[0066] A determination may be made whether the executor is connected wirelessly to the router, at **402**. If the executor is connected wirelessly to the router, then the current SSID, BSSID, and WEP key (if any) may be sent to network devices, at **404**, and the method proceeds to step **412**. The network devices may be network devices, such as network devices **102-106**. If the executor is not wirelessly connected to the router, then the executor may send a request to the network devices, asking for any known SSID-BSSID pairs, at **406**. The executor may receive a set of known SSID-BSSID pairs from the network devices, at **408**. The executor may determine whether a MAC address previously entered by a user matches one of the BSSIDs in the set of known SSID-BSSID pairs, at **410**. If the MAC address entered by the user matches one of the BSSIDs in the set of known SSID-BSSID pairs, then the corresponding SSID-BSSID pair may be used to configure the router, at **414**, and the method proceeds to step **422**.

[0067] If the MAC address entered by the user does not match any of the BSSIDs in the set of known SSID-BSSID pairs, then the executor may start at the root HTML page of the router **114**, and copy the HTML content in the HTML web management pages of the router **114**, at **412**. A determination may be made whether the current SSID-BSSID pair is known, at **416**. If the current SSID-BSSID pair is known, then the method may proceed to step **422**. If the current SSID-BSSID is not known, then a determination may be made whether a BSSID found in the copied HTML content matches one of the BSSIDs in the set of known SSID-BSSID pairs, at **418**. If a BSSID in the set of known SSID-BSSID pairs matches a BSSID in the copied HTML content, then the corresponding SSID-BSSID pair may be stored as the current SSID-BSSID, at **420**.

[0068] The executor may send a copy of the root HMTL page of the router to a server, at **422**. For example, the executor may send the root HTML page of the router to a server, such as the server **122** in FIG. **1**, and request the server **122** to determine if the root HTML page of the router **114** matches an entry in a database of router configuration information at the server **122**. The executor may receive a unique identifier identifying the executor, and router information from the server, at **424**. A determination may be made whether the router information sent by the server contains configuration information for configuring the router, at **426**. If the router information contains configuration information, then the executor may configure the router, at **428**, and the method may end, at **432**. If the router information does not contain configuration information, then the executor may determine the parameters for configuring the router, and may configure the router, at **430**. The method may then end, at **432**.

[0069] Referring to FIG. **5**, a flow chart of a fourth illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **500**. The method **500** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**. The software module may, for example, be software, such as software **126**, installed on a network device, such as network device **102**. The method **500** may be used to determine and set one or more parameters of a router, such as the router **114** in FIG. **1**. For example, the method **500** may be used to determine and set an SSID for a router.

[0070] To determine an SSID to set for a router, an executor may add HTML input element of type of "text" to a set of candidate SSID, at **502**. All candidates that were previously set to the desired SSID may be removed from the set of candidates, at **504**. A determination may be made whether the current SSID is known and whether a candidate SSID matches the current SSID, at **506**. If the current SSID is known, and a candidate SSID matches the current SSID, then all other candidate SSIDs may be removed from the set of candidate SSIDs, at **508**, and the method may proceed to **520**.

[0071] If the current SSID is not known or none of the candidate SSIDs match the current SSID, then a determination is made whether a candidate SSID has a value that is in the set of potential SSIDs, at **510**. If a candidate SSID has a value that is in the set of potential SSIDs, then all other candidate SSIDs may be removed from the set of candidate SSIDs, at **508**, and the method may proceed to **520**. A determination may be made whether a candidate SSID matches an SSID previously received from a server, at **512**. The server may be a server, such as server **122** in FIG. **1**. If a candidate SSID matches an SSID previously received from a server, then all other candidate SSIDs may be removed from the set of candidate SSIDs, at **508**, and the method may proceed to **520**.

[0072] A determination may be made whether the maxLength of a candidate SSID is equal to a previously specified size, at **514**. The HTML maxLength command may be used to determine the maximum number of characters in a text field. If the maxLength of a candidate SSID is equal to a previously specified size then all other candidate SSIDs may be removed from the set of candidate SSIDs, at **508**, and the method may proceed to **520**. For example, if the previously specified size

is thirty-two characters, then any candidate SSID with a length of thirty-two characters may be selected as the candidate SSID and all other candidates may be removed from consideration. A determination may be made whether a candidate has no maxLength specified, at **516**. If a candidate has no maxLength specified, then all other candidates may be removed from consideration, at **508**.

[0073] If a candidate has a maxLength specified, then a determination may be made whether a candidate SSID appears on an HTML page with a text field indicating the SSID, at **518**. For example, a text field with the text "SSID", "service set identifier", or "service set id", in any combination of upper or lowercase letters, may be considered a text field indicating the SSID. If a candidate SSID appears on an HTML page indicting the SSID, then all other candidate SSIDs may be removed from the set of candidate SSIDs, at **508**, and the method may proceed to **520**.

[0074] If a candidate SSID does not appear on an HTML page indicating the SSID, then a determination may be made whether any candidates are left, at **520**. If there is at least one candidate left, then the SSID may be set, at **522**, and the method ends at **524**. If no candidates are left, then an error may be reported, at **526**, and the method may end at **524**.

[0075] Referring to FIG. **6**, a flow chart of a fifth illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **600**. The method **600** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**. The software module may, for example, be software, such as software **126**, installed on a network device, such as network device **102**. The method **600** may be used to determine and set one or more parameters of a router, such as the router **114** in FIG. **1**. For example, the method **600** may be used to determine and enable an encryption protocol, such as WEP, for a router.

[0076] At **602**, HTML input elements with type "option" or "radio" may be added to a set of candidate WEP controls. At **604**, "option" HTML input elements that are in a selected state may be removed from the candidate set. At **606**, "radio" HTML input elements that are in a selected state may be removed from the candidate set. At **608**, a determination may be made whether a candidate matches a previously sent HTML input element. For example, a server, such as the server **122** in FIG. **1** may send an HTML input element when the server sends an executor identifier. If a candidate matches a previously sent HTML input element, then all other candidates may be removed from the candidate set at **610**, WEP may be enabled using the candidate at **612**, and the method may end at **614**.

[0077] If at **608** a candidate does not match a previously sent HTML input element, then all "option" elements that allow multiple selection may be removed from the candidate set at **616**. At **618**, all candidates that are checked or selected may be removed from the candidate set. At **620**, a determination may be made whether the text displayed by a candidate includes the characters "WEP", "128", or "104". If the text displayed by a candidate includes the characters "WEP", "128", or "104", then all other candidates may be removed from the candidate set at **610**, WEP may be enabled using the candidate at **612**, and the method may end at **614**.

[0078] If the text displayed by each candidate in the candidate set does not include the characters "WEP", "128", or "104", then at **622** a determination may be made whether any candidates are on a page which includes the text "security", "encryption", or "WEP". The text "security", "encryption", or "WEP" may be in any combination of uppercase and lowercase characters. If a candidate is on a page that includes the text "security", "encryption", or "WEP", then all other candidates may be removed from the candidate set at **610**, WEP may be enabled using the candidate at **612**, and the method ends at **614**. If none of the candidates are on a page that includes the text "security", "encryption", or "WEP", then an error may be reported at **624**, and the method ends at **614**.

[0079] Referring to FIG. **7**, a flow chart of a sixth illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **700**. The method **700** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**. The software module may, for example, be software, such as software **126**, installed on a network device, such as network device **102**. The method **700** may be used to set one or more parameters of a router, such as the router **114** in FIG. **1**. For example, the method **700** may be used to determine and set an encryption key, such as a WEP key, for a router.

[0080] At **702**, HTML input elements of type "text" may be added to a candidate set of WEP key controls. At **704**, a candidate may be selected from the candidate set. At **706**, a determination may be made whether a POST command previously used to set the SSID changed only one text input and whether that text input is a candidate. If at **706** the POST command previously used to set the SSID changed only one text input and that text input is a candidate, then that candidate may be removed from the candidate set at **708**, and the method continues to step **710**. If at **706** a determination is made that the POST command previously used to set the SSID changed only one text input but that text input is not a candidate, then at step **710**, a determination may be made whether any candidate matches a previously supplied input element. For example, a server, such as the server **122** in FIG. **1** may send an input element when the server sends an executor identifier.

[0081] If at **710** a candidate matches a previously supplied input element, then at **712** all other candidates may be removed from the candidate set, the WEP key may be set using the remaining candidate, and the method ends at **714**. If at **710** none of the candidates match a previously supplied input element, then at **716** a determination may be made whether a candidate has a maxLength of 26 or 10. If at **716** a candidate is determined to have a maxLength of 26 or 10, then at **712** all other candidates may be removed from the candidate set, the WEP key may be set using the remaining candidate, and the method ends at **714**. If at **716** a determination is made that none of the candidates have a maxLength of 26 or 10, then at **718** a determination may be made whether a candidate has a name that includes the characters "key", "WEP", "encryption", or "security". If at **718** a determination is made that the candidate has a name that includes the characters "key", "WEP", "encryption", or "security", then at **712** all other candidates may be removed from the candidate set, the WEP key may be set using the remaining candidate, and the method ends at **714**.

[0082] If at **718** a determination is made that the candidate does not have a name that includes the characters "key", "WEP", "encryption", or "security", then at **720** a determi-

nation may be made whether the executor enabled WEP and whether a candidate is on the page used to enable WEP. If at **720** a determination is made that the executor enabled WEP and that a candidate is on the page used to enable WEP, then at **712** all other candidates may be removed from the candidate set, the WEP key may be set using the remaining candidate, and the method may end at **714**.

[0083] If at **720** a determination is made that none of the candidates are on the page the executor used to enable WEP then at **722** a determination may be made whether the executor enabled WEP and whether the router's HTML pages was copied after WEP was enabled. If at **722** a determination is made that the executor enabled WEP and the router's HTML pages were not copied after WEP was enabled, then at **724** a new copy of the HTML pages may be copied from the router and used to replace the stored HTML pages, and the method proceeds to **704** and a candidate may be selected from the candidate set.

[0084] If at **722** a determination may be made that the executor enabled WEP and the router's HTML pages were copied after WEP was enabled then at **726** a determination may be made whether the candidate set has at least one candidate. If at **726** a determination is made that there are no candidates on the candidate set, then at **726** an error may be reported and the method ends at **714**. If at **726** a determination is made that there is at least one candidate left on the candidate set, then the method may proceed to **704** and a candidate may be selected from the candidate set.

[0085] Referring to FIG. **8**, a flow chart of a seventh illustrative embodiment of a method of controlling and configuring a router is depicted and generally designated **800**. The method **800** can be executed via a software module at a network device capable of connecting to the network, such as the network device **102**, the network device **104**, or the network device **106** in FIG. **1**. The software module may, for example, be software, such as software **126**, installed on a network device, such as network device **102**. The method **800** may be used to set one or more parameters of a router, such as the router **114** in FIG. **1**. For example, the method **800** may be used to set SSID, enable encryption, such as WEP, and set an encryption key for the router.

[0086] At **802**, an HTML form with at least one parameter control field may be selected from a set of forms. For example, when setting the SSID for the router, an HTML form containing at least one candidate SSID control field may be selected from a set of HTML forms. At **804**, a candidate parameter may be selected from a set of candidates. For example, when setting the SSID for the router, a candidate SSID may be selected from a set of candidate SSIDs. At **806**, other network devices may be informed that a parameter is being experimentally set. For example, an executor may send a message to the server **122**, and the server **122** may notify each of the network devices **102-106** that a parameter of the router is being experimentally changed. At **808**, a POST command based on the candidate parameter value may be sent to the router. At **810**, a determination may be made whether the executor has the capability of wirelessly connecting to the router. For example, the executor may be capable of wirelessly connecting to the router if the executor has a wireless network adapter installed.

[0087] If the executor does not have the capability of wirelessly connecting to the router, then at **812** the executor asks the other network devices to try and connect wirelessly to the router with the candidate parameter, and the method proceeds to **828**. If the executor does have the capability of wirelessly connecting to the router, then at **814** the executor tries to wirelessly connect to the router using the candidate parameter. At **816**, a determination may be made whether a network device wirelessly connected to the router. If a network device was able to connect to the router, then the method ends at **818**. If none of the network devices were able to wirelessly connect to the router then at **820** the candidate parameter may be removed from the set of candidates. At **822**, a determination may be made whether there are any more candidate parameters.

[0088] If there are more candidate parameters, then the method goes to **804** and selects a candidate parameter from the set of candidates. If there are no more candidate parameters, then at **824** the HTML form may be removed from consideration. At **826**, a determination may be made whether there are more HTML forms. If there are more HTML forms then the method goes to **802** and an HTML form with at least one parameter control field may be selected from the set of the forms. If there are no more HTML forms, then at **828** an error may be reported, and the method may end at **818**.

[0089] At **828**, a determination may be made whether the executor is wirelessly connected to the router using the candidate parameter. If the executor is wirelessly connected to the router, then the method may end at **818**. If the executor is not wirelessly connected to the router, then the executor may restore the previously values of the HTML form, and the method continues at **820**.

[0090] Referring to FIG. **9**, a block diagram of an illustrative embodiment of a network device is depicted and generally designated **900**. The network device **900** is an example of a network device, such as the network device **102**, **104**, or **106** in FIG. **1**, in which a module, such as the modules **130**, **132**, or **134**, respectively, may be located. In this illustrative embodiment, a processor **902** may connect to a bus **904**. The processor **902** may be used to execute instructions contained in a module, such as the module **130** in FIG. **1**. Connected to the bus **904** may be a read only memory **906**. The read only memory **906** may contain instructions to load an operating system when the network device is powered on.

[0091] A storage **908** may also connect to bus **904**. The storage **908** may be a data storage device, such as a hard disk drive, an optical storage drive, or a solid-state storage device, such as flash memory. Ports **910** may connect to the bus **904**. The ports **910** may contain one or more ports, such as a Universal Serial Bus (USB) port, an Ethernet port, or an IEEE 1394 port. Network adapter **912** may connect to the bus **904**. The network adapter **912** may be one or more adapters for connecting the network device **900** to different types of networks. For example, the network adapter **912** may be capable of wireless networking using a wireless connection protocol such as **902.11** ("Wi-Fi"), Wireless USB, Bluetooth, CDMA, or GSM.

[0092] An input adapter **914** may connect to the bus **904**. The input adapter **914** may be capable of accepting input from one or more user input devices, such as a keyboard, a mouse, a speech recognition device, or a stylus. An output adapter **916** may also connect to bus the **904**. The output adapter may be capable of outputting text and/or graphics to an output display device, such as a liquid crystal device (LCD) screen. A memory **918** may also connect to the bus **904**. The memory **918** may contain a module, such as the module **130**, executable by the processor **902**.

[0093] In accordance with various embodiments of the present disclosure, the methods described herein may be implemented by software programs executable by a computer system. Further, the present disclosure contemplates a computer-readable medium that includes instructions to perform the methods described herein.

[0094] The term "computer-readable medium" includes a single medium or multiple media, such as a centralized or distributed database, and/or associated caches and servers that store one or more sets of instructions. The term "computer-readable medium" shall also include any medium that is capable of storing, encoding or carrying a set of instructions for execution by a processor or that cause a computer system to perform any one or more of the methods or operations disclosed herein.

[0095] In a particular non-limiting, exemplary embodiment, the computer-readable medium can include a solid-state memory such as a memory card or other package that houses one or more non-volatile read-only memories. Further, the computer-readable medium can be a random access memory or other volatile re-writable memory. Additionally, the computer-readable medium can include a magnetic, magneto-optical, or optical medium, such as a disc drive or tapes or other storage device. Accordingly, the disclosure is considered to include any one or more of a computer-readable medium or a distribution medium and other equivalents and successor media, in which data or instructions may be stored.

[0096] Although the present specification describes components and functions that may be implemented in particular embodiments with reference to particular standards and protocols, the disclosed embodiments are not limited to such standards and protocols. For example, standards for Internet and other packet switched network transmission (e.g., TCP/IP, UDP/IP, HTML, HTTP) represent examples of the state of the art. Such standards are periodically superseded by faster or more efficient equivalents having essentially the same functions. Accordingly, replacement standards and protocols having the same or similar functions as those disclosed herein are considered equivalents thereof.

[0097] The illustrations of the embodiments described herein are intended to provide a general understanding of the structure of the various embodiments. The illustrations are not intended to serve as a complete description of all of the elements and features of apparatus and systems that utilize the structures or methods described herein. Many other embodiments may be apparent to those of skill in the art upon reviewing the disclosure. Other embodiments may be utilized and derived from the disclosure, such that structural and logical substitutions and changes may be made without departing from the scope of the disclosure. For example, substitutions may be made to search for language similar to the language used in the searches specified above, that is the lists of text to search for provided in this description is not exhaustive and the scope of the disclosure is intended to include any other words or text that may indicate the nature of what is being searched for.

[0098] Additionally, the illustrations are merely representational and may not be drawn to scale. Certain proportions within the illustrations may be exaggerated, while other proportions may be reduced. Accordingly, the disclosure and the figures are to be regarded as illustrative rather than restrictive.

[0099] One or more embodiments of the disclosure may be referred to herein, individually and/or collectively, by the term "invention" merely for convenience and without intending to voluntarily limit the scope of this application to any particular invention or inventive concept. Moreover, although specific embodiments have been illustrated and described herein, it should be appreciated that any subsequent arrangement designed to achieve the same or similar purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all subsequent adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the description.

[0100] The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.82(b) and is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, various features may be grouped together or described in a single embodiment for the purpose of streamlining the disclosure. This disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter may be directed to less than all of the features of any of the disclosed embodiments. Thus, the following claims are incorporated into the Detailed Description, with each claim standing on its own as defining separately claimed subject matter.

[0101] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments which fall within the true spirit and scope of the present invention. Thus, to the maximum extent allowed by law, the scope of the present invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.

What is claimed is:

1. A method comprising:
- identifying a first network device in communication with a computer via a network;
- searching a library of network device commands at the computer for commands that are associated with the first network device;
- determining at the computer a set of commands that are executable by the first network device; and
- sending at least one control command from the computer that is executable by the first network device to configure the first network device.

2. The method of claim **1**, wherein the at least one control command is executable by the first network device to configure at least one of a network setting and a security setting.

3. The method of claim **1**, wherein the network device is one of a computer, a server, a router, a printer, a modem, a switch, a gateway, and a portable device coupled to the network.

4. The method of claim **3**, wherein the library includes a first set of commands that are specific to a first type of network device of a first vendor, and wherein the library includes a second set of commands that are specific to a second type of network device of a second vendor.

5. The method of claim **3**, wherein the library does not include commands that are associated with the first network device, and further comprising:
- querying the first network device to determine the at least one control command; and

adding the at least one control command to the library at the computer.

6. The method of claim **5**, wherein the querying includes sending at least one message to the first network device to probe a network management interface; and further comprising:

detecting a response of the first network device to the at least one message; and

determining the set of commands that are executable by the first network device based on the response.

7. The method of claim **5**, wherein the adding does not include a recompilation of the library of network device commands.

8. The method of claim **5**, further comprising:

sending the at least one control command to a server that maintains the library of network device commands.

9. The method of claim **1**, wherein the set of commands that are executable by the first network device are determined by user input at the computer, and further comprising:

recording the user input; and

adding the set of commands to the library of network device commands at the computer.

10. A system comprising:

a processor; and

a memory that is accessible to the processor, wherein the memory includes instructions that are executable by the processor to:

detect a network device that is accessible to the computer via a network;

probe a network management interface of the network device via the network;

determine a set of commands that are executable by the network device to configure the network device; and

store the set of commands in a library of network device commands.

11. The system of claim **10**, wherein the memory includes instructions that are executable by the processor to automatically probe the network management interface, determine the set of commands that are executable by the network device, and store the set of commands, without requiring user input.

12. The system of claim **11**, wherein the memory includes instructions that are executable by the processor to send at least one command to the network device to configure the network device based on at least one network policy.

13. The system of claim **12**, wherein the network policy is at least one of a security policy and a configuration policy.

14. The system of claim **10**, wherein the set of commands that are stored in the library of network device commands are indexed and retrievable by the processor without first operating on the library with a compiler.

15. The system of claim **10**, wherein the probing includes sending a request to the network device for information corresponding to the network management interface.

16. The system of claim **10**, wherein the probing includes performing at least one iteration of:

determining a trial configuration command to send to the network device;

sending the trial configuration command to the network device; and

determining a response of the trial configuration command at the network device.

17. A computer readable medium comprising computer readable instructions, wherein the computer readable instructions are executable by a processor to:

record user input at a computer, the user input corresponding to configuration commands that are executable by a network device that is in communication with the computer via a network;

generate a set of the configuration commands; and

store the set of configuration commands to a library of network device commands.

18. The computer readable medium of claim **17**, wherein the computer readable instructions are further executable by the processor to:

retrieve at least one configuration command of the set of configuration commands from the library; and

send the at least one configuration command to the network device, wherein the library is not recompiled by a compiler before the at least one configuration command is retrieved.

19. The computer readable medium of claim **17**, wherein the computer readable instructions are further executable by the processor to:

receive a network configuration policy;

determine that the network device does not comply with the network configuration policy; and

generate a prompt for the user input, wherein the network policy is at least one of a security policy and a configuration policy.

20. The computer readable medium of claim **17**, wherein the network policy is a wireless network security policy.

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